

## FURTHER RECORDS OF PHLEBOTOMID SANDFLIES (DIPTERA: PHLEBOTOMIDAE) FROM CAMPECHE, MEXICO<sup>1</sup>

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**ABSTRACT:** *Leishmania mexicana* is endemic in southern Mexico, vectors of this parasite are phlebotomid sandflies. As part of entomological surveys carried out in the state of Campeche, we collected sandflies from different sites. A total of 16 species in two genera were recorded. Most of the species had been recorded previously in the state of Campeche, although in different counties. Two species; *L. longipalpis* and *L. ylephiletor* are recorded for the first time in Campeche, whilst *L. undulata* is confirmed to occur in Campeche.

**KEY WORDS:** Phlebotomidae, Phlebotominae, Diptera, Campeche, Mexico, leishmaniasis

Phlebotomine sandflies are the vectors of *Leishmania* parasites causing human leishmaniasis (Killick-Kendrick, 1999). Cutaneous leishmaniasis (CL) in southern Mexico is endemic and it is chiefly due to *L. mexicana* (Biagi). The state of Campeche is known to be an endemic area of CL (Rebollar-Téllez et al., 1996b). Knowledge of sandfly fauna is therefore an important component for understanding parasite transmission in Campeche. Field studies on sandflies in Campeche have been conducted by several authors (e.g. Biagi and de Biagi, 1953, Rebollar-Téllez et al., 1996b, c and d). In spite of the importance of transmission of *L. mexicana* in Campeche, during the last five years no field studies nor collections of sandflies had been undertaken in this state. The present paper documents recent collections of phlebotomine sandflies in several foci of Campeche and compares them to the previous records of sandfly species in Mexico and Campeche.

### METHODS

Collection of sandflies was conducted in several occasions from March 2001 to March 2002. Catches were carried out in five locations ("ejidos") of the state of Campeche. Locations were situated in La Libertad, (N 18°31.60' W 90°27.89') Escárcega, Dzibalché, (N 20°19.23' W 90°13.41') Calkini, "20 de Noviembre" (no coordinates available) Dos Naciones (N 17°58.40' W 89°20.74'), and La Guadalupe (N 18°20.24', W 89°28.49') Calakmul. Trapping methods included

<sup>1</sup> Received on April 23, 2004. Accepted on October 15, 2004.

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Shannon traps (for anthrophilic species), light CDC traps, Disney traps (for rodentophilic species), funnel traps set at animal burrows, as well as manual captures on human bait and into tree holes. Unless otherwise stated, for each collection, the trapping method is indicated as Shannon, CDC, Disney, or funnel. Trapping effort was unequal in each location concerning the kind of used traps and days of collecting. Traps (except Shannon trap) were set before dusk and were collected at dawn. Sandflies were preserved in 8 ml glass vials containing 70 percent ethanol. Later in the laboratory, flies were cleared with a solution of 20 percent NaOH, then they were placed onto glass microscope slides and mounted in either Berlese fluid (Entomopraxis S. C., Barcelona, Spain) or DPX (Watkins and Doncaster, The Naturalists, Kent, England). Flies were identified under a light binocular microscope using the keys of Young (1979) and Young and Duncan (1994). Voucher specimens have been kept in the entomological collection of the Universidad Autónoma de Yucatán with some duplicates deposited at the entomological collection at the Centre for Applied Entomology and Parasitology, School of Life Sciences, Keele University (Staffordshire, England).

## RESULTS AND DISCUSSION

A total of 16 species in two genera were recorded in this survey. Dos Naciones was the location with the highest number of species ( $n=15$ ) followed by La Guadalupe ( $n=8$ ), however, this figure should be taken with caution as it may be due to the more frequent catches (trapping effort) of sandflies in these two sites. The species composition for each location is listed in Table 1.

### *Brumptomyia hamata* (Fairchild and Hertig, 1947)

**Material Examined:** 4 ♀, 12 ♂. Campeche, Dos Naciones, Calakmul, 18 Oct 2001 (2 ♂ CDC), 21 Nov 2001 (1 ♀ Shannon, 1 ♂ CDC), 19 Jan 2002 (2 ♂ CDC), 21 Jan 2002 (2 ♂ CDC), La Libertad, Escárcega, 02 Nov 2001 (1 ♂ CDC), 04 Nov 2001 (3 ♀ funnel trap, 4 ♂ tree hole).

This is the first record of the species for the county of Calakmul. This species had previously been reported in Escárcega, Campeche by Navarro-Correa (1995) and Rebollar-Téllez et al. (1996a).

### *Brumptomyia galindoi* (Fairchild and Hertig, 1947)

**Material Examined:** 17 ♀, 81 ♂. Campeche, Dos Naciones, Calakmul, 17 Oct 2001 (3 ♀, 10 ♂ CDC), 18 Oct 2001 (4 ♀, 9 ♂ funnel, 3 ♀, 21 ♂ CDC), 21 Nov 2001 (2 ♀ CDC), 22 Nov 2001 (2 ♀, 2 ♂ CDC), 23 Nov 2001 (1 ♀, 11 CDC), 18 Jan 2002 (1 ♀, 9 ♂ CDC), 19 Jan 2002 (2 ♀, 4 ♂ CDC), 20 Jan 2002 (1 ♀, 2 ♂ CDC), 21 Jan 2002 (3 ♂ CDC), 20 de Noviembre, Calakmul, 22 Mar 2001 (2 ♂ Shannon), La Libertad, Escárcega, 02 Nov 2001 (1 ♂ CDC), 04 Nov 2001 (1 ♂ funnel, 4 ♂ tree hole).

This species had previously been reported by Navarro-Correa (1995) and Rebollar-Téllez et al. (1996a) in the county of Escárcega. This is the first report in the county of Calakmul. Ibañez-Bernal (1999) refers this species as *B. mesai* Sherlock on the basis of a shorter wing length to that which was given by Fairchild and Hertig (1947) in their original description. In addition, Ibañez-

Table 1. Known distribution of sand fly species in five sites of the counties of Calkini, Calakmul, and Escárcega, all located in the State of Campeche, México. Site 1 = Dos Naciones, Site 2 = La Guadalupe, Site 3 = 20 de Noviembre. Site 4 = Dzibalché, and Site 5 = La Libertad.

Species	Site 1	Site 2	Site 3	Site 4	Site 5
<i>Brumptomyia hamata</i>	1♀ 7♀				3♀ 5♂
<i>B. galindoi</i>	17♀ 73♂		2♂		6♂
<i>Lutzomyia cruciata</i>	201♀ 3♂	608♂	5♂	1♂	70♂
<i>L. longipalpis</i>	3♀				
<i>L. gomezi</i>	3♀				
<i>L. ovallesi</i>	323♀ 3♂	14♀	71♀ 1♂		3♀
<i>L. serrana</i>	2♀				
<i>L. deleoni</i>	92♀ 2♂	6♀	2♀ 2♂		41♀ 8♂
<i>L. permira</i>		1♂	3♂		
<i>L. shannoni</i>	140♀ 37♂	43♀ 1♂	1♀	1♀	26♀ 8♂
<i>L. undulata</i>	3♀	1♂			
<i>L. carpenteri</i>	54♀ 31♂				
<i>L. olmeca olmeca</i>	160♀ 1♂	83♀ 3♂	6♀ 12♂	1♀	108♀
<i>L. ylephiletor</i>	25♀ 1♂				
<i>L. panamensis</i>	345♀ 92♂	55♀ 5♂	1♀ 1♂		1♀ 5♂
<i>L. trinidadensis</i>	31♀ 5♂				

Bernal (1999) points out that the Mexican specimens never possess seven or eight spines in the inner side of the gonocoxite. In this paper, we decided to adopt a more conservative position in regard of Ibáñez-Bernal (1999) resurrection of *B. mesai*. We propose to maintain the name *B. galindoi* for the Mexican specimens until new and stronger evidence becomes available to consider *B. galindoi* and *B. mesai* as distinct species.

#### *Lutzomyia (Lutzomyia) cruciata* (Coquillett, 1907)

**Material Examined:** 885 ♀, 3 ♂. Campeche, Dos Naciones, Calakmul, 17 Oct 2001 (1 ♀ tree hole), 18 Oct 2001 (14 ♀ Shannon, 1 ♀ CDC), 21 Nov 2001 (56 ♀ Shannon, 2 ♀ CDC), 22 Nov 2001 (17 ♀ Shannon), 23 Nov 2001 (13 ♀ Shannon), 24 Nov 2001 (10 ♀ Shannon, 1 ♀ CDC), 18 Jan 2002 (9 ♀ Shannon), 19 Jan 2002 (3 ♀ Shannon, 2 ♀ light CDC), 20 Jan 2002 (4 ♀ Shannon), 21 Jan 2002 (5 ♀ Shannon, 2 ♂ CDC), 22 Jan 2002 (1 ♀ Shannon), 24 Jan 2002 (2 ♀ Shannon), 25 Jan 2002 (5 ♀ Shannon), 26 Jan 2002 (4 ♀ Shannon), 25 Mar 2002 (6 ♀ Shannon), 26 Mar 2002 (14 ♀ Shannon), 27 Mar 2002 (5 ♀ Shannon), 28 Mar 2002 (17 ♀ Shannon), 29 Mar 2002 (8 ♀ Shannon),

30 Mar 2002 (1 ♀, 1 ♂ Shannon), La Guadalupe, Calakmul, 21 Oct 2001 (1 ♀ CDC), 22 Oct 2001 (56 ♀ Shannon), 6 Dec 2001 (60 ♀ Shannon, 11 ♀ CDC), 7 Dec 2001 (26 ♀ Shannon), 8 Dec 2001 (51 ♀ Shannon), 9 Dec 2001 (26 ♀ Shannon), 10 Dec 2001 (22 ♀ Shannon), 11 Dec 2001 (50 ♀ Shannon), 12 Dec 2001 (136 ♀ Shannon), 13 Dec 2001 (32 ♀ Shannon), 14 Dec 2001 (104 ♀ Shannon), 17 Feb 2002 (1 ♀ Shannon), 18 Feb 2002 (3 ♀ Shannon), 19 Feb 2002 (5 ♀ Shannon), 20 Feb 2002 (5 ♀ Shannon), 21 Feb 2002 (13 ♀ Shannon), 24 Feb 2002 (5 ♀ Shannon), 25 Feb 2002 (1 ♀ Shannon), 20 Noviembre, Calakmul, 22 Mar 2001 (5 ♀ Shannon), Dzibalche, Calkini, 06 Jul 2001 (1 ♀, human bait), La Libertad, Escárcega, 01 Nov 2001 (44 ♀ Shannon), 02 Nov 2001 (13 ♀ Shannon, 1 ♀ CDC, 1 ♀ human bait), 03 Nov 2001 (1 ♀ Shannon, 1 ♀ CDC), 04 Nov 2001 (9 ♀ Shannon).

This is the first record in the counties of Calkini and Calakmul. *Lutzomyia cruciata* is also known for the states of Quintana Roo (Cruz-Ruiz et al. 1994) and Yucatán (Rebollar-Téllez and Manrique-Saide, 2001). Ibáñez-Bernal (1999) reports this species as the most widely distributed species in México, occurring in 16 states in México. Currently, *L. cruciata* continues to be one of the suspected vectors of *Le. mexicana* in the Yucatán Peninsula and probably in other areas of México.

### *Lutzomyia (Lutzomyia) longipalpis* (Lutz and Neiva, 1912)

**Material Examined:** 3 ♀. Campeche, Dos Naciones, Calakmul, 28 Mar 2002 (1 ♀ Shannon), 29 Mar 2002 (1 ♀ Shannon), 30 Mar 2002 (1 ♀ Shannon).

This is the first report of *L. longipalpis* for the state of Campeche. In the Yucatán Peninsula, it has been reported in the neighboring states of Yucatán and Quintana Roo (Ibáñez-Bernal, 1999 for references). *Lutzomyia longipalpis* is the main vector of *Le. infantum* in the New World. Recent evidence shows that *L. longipalpis* is a species complex of at least three different members based on the stereochemistry of the male-sex pheromone (Hamilton et al. 1996). No Mexican specimens have hitherto been analyzed to compare the sex pheromone profiles.

### *Lutzomyia (Lutzomyia) gomezi* (Nitzulescu, 1931)

**Material Examined:** 3 ♀. Campeche, Dos Naciones, Calakmul, 18 Jan 2002 (1 ♀ Shannon), 20 Jan 2002 (1 ♀ Shannon), 26 Jan 2002 (1 ♀ Shannon).

Ibáñez-Bernal (1999) reports this species from the county of Escárcega based on the works of Ramírez-Fraire (1992) and Navarro-Correa (1995). However, none of these authors seems to have deposited their specimens in an entomological collection for further comparison.

### *Lutzomyia ovallesi* (Ortiz, 1952)

**Material Examined:** 411 ♀, 4 ♂. Campeche, Dos Naciones, Calakmul, 18 Oct, 2001 (118 ♀ Shannon, 1 ♀ CDC), 21 Nov 2001 (54 ♀ Shannon), 22 Nov 2001 (16 ♀ Shannon), 23 Nov 2001 (6 ♀ Shannon), 24 Nov 2001 (2 ♀ Shannon), 22 Jan 2002 (1 ♀ Shannon), 24 Jan 2002 (1 ♀ Shannon), 25 Jan 2002 (1 ♀ Shannon), 25 Mar 2002 (10 ♀ Shannon), 26 Mar 2002 (10 ♀, 1 ♂ Shannon), 27 Mar 2002 (21 ♀ Shannon), 28 Mar 2002 (46 ♀ Shannon), 29 Mar 2002 (21 ♀, 1 ♂ Shannon), 30 Mar 2002 (15 ♀, 1 ♂ Shannon), La Guadalupe, Calakmul, 29 Apr 2001 (1 ♀ CDC), 22 Oct 2001 (2 ♀ Shannon), 6 Dec 2001 (4 ♀ Shannon), 7 Dec 2001 (1 ♀ Shannon), 8 Dec 2001 (1 ♀ Shannon), 9 Dec 2001 (1 ♀ Shannon), 20 Feb 2002 (1 ♀ Shannon), 21 Feb 2002 (3 ♀ Shannon), 20 de Noviembre, Calakmul, 22 Mar 2001 (71 ♀, 1 ♂ Shannon), La Libertad, Escárcega, 01 Nov 2001 (2 ♀ Shannon), 02 Nov 2001 (1 ♀ Shannon).

This is the first report of *Lutzomyia ovallesi* for the county of Calakmul. This species has been reported in the states of Quintana Roo (Ibáñez-Bernal, 1999) and Campeche (Navarro-Correa, 1995). The later author reported *L. ovallesi* in the county of Escárcega (no specimens available). *Lutzomyia ovallesi* has been found infected with *Le. braziliensis* in Guatemala (Rowton et al., 1992).

### ***Lutzomyia serrana* (Damasceno and Arouck, 1949)**

**Material Examined:** 2 ♀. Campeche, Dos Naciones, Calakmul, 18 Oct 2001 (1 ♀ CDC), La Libertad, Escárcega 02 Nov 2001 (1 ♀ Shannon).

This is the first report in the county of Calakmul. This species has been previously known in Chiapas and Nayarit (Ibáñez-Bernal, 1999). Navarro-Correa (1995) also listed this species in Escárcega, however there are no specimens available.

### ***Lutzomyia (Coromyia) deleoni* (Fairchild and Hertig, 1947)**

**Material Examined:** 141 ♀, 12 ♂. Campeche, Dos Naciones, Calakmul, 17 Oct 2001 (2 ♀ CDC), 18 Oct 2001 (5 ♀ Shannon, 30 ♀ CDC, 5 ♀ funnel), 22 Nov 2001 (1 ♀ Shannon, 7 ♀ CDC), 23 Nov 2001 (2 ♀ Shannon, 6 ♀ CDC), 24 Nov 2001 (2 ♀ Shannon, 13 ♀ CDC), 18 Jan 2002 (4 ♀ CDC), 19 Jan 2002 (2 ♂ Shannon, 6 ♀ CDC), 20 Jan 2002 (1 ♀ Shannon, 4 ♀ CDC), 21 Jan 2002 (4 ♀ CDC). La Guadalupe, Calakmul, 29 Apr 2001 (1 ♀ CDC), 6 Dec 2001 (4 ♀ CDC), 14 Dec 2001 (1 ♀ Shannon), 20 de Noviembre, Calakmul, 22 Mar 2001 (2 ♀, 1 ♂ Shannon), 28 Apr 2001 (1 ♂ funnel), La Libertad, Escárcega, 01 Nov 2001 (3 ♀ Shannon, 4 ♀ CDC), 02 Nov 01 (6 ♀ Shannon, 4 ♀ CDC), 03 Nov 2001 (5 ♀, 1 ♂ CDC), 04 Nov 2001 (2 ♀ Shannon, 4 ♀, 3 ♂ funnel, 13 ♀, 4 ♂ tree hole).

This is the first report of *L. deleoni* for the county of Calakmul. This species had previously been reported in the county of Escárcega by Ramírez-Fraire (1992) and by Navarro-Correa (1995) with no specimens available from either of their reports. Rebollar-Téllez et al. (1996a) also reported this species in Escárcega and the studied material remains at the Entomological Collection of the Universidad Autónoma de Yucatán

### ***Lutzomyia (Dampfomyia) permira* (Fairchild and Hertig, 1956)**

**Material Examined:** 4 ♀. Campeche, 20 de Noviembre, 28 Oct 2001 (3 ♂ funnel), La Guadalupe, Calakmul, 21 Feb 2002 (1 ♂, CDC).

This is the first report of *L. permira* in the county of Calakmul. The specimen collected in La Guadalupe has been deposited at the School of Life Sciences, Keele University.

### ***Lutzomyia (Psathyromyia) shannoni* (Dyar, 1929)**

**Material Examined:** 211 ♀, 46 ♂. Campeche, Dos Naciones, Calakmul, 17 Oct 2001 (3 ♀, 1 ♂ Shannon, 1 ♀ 1 ♂ CDC), 18 Oct 2001 (7 ♀, 3 ♂ Shannon), 21 Nov 2001 (42 ♀, 2 ♂ Shannon), 22 Nov 2001 (6 ♀, 1 ♂ Shannon, 1 ♂ CDC), 23 Nov 2001 (3 ♀ Shannon), 24 Nov 2001 (2 ♀ Shannon), 18 Jan 2002 (1 ♀ CDC), 19 Jan 2002 (1 ♀ CDC), 21 Jan 2002 (1 ♀ Shannon), 25 Mar 2002 (3 ♀, 1 ♂ Shannon), 26 Mar 2002 (21 ♀, 3 ♂ Shannon), 27 Mar 2002 (9 ♀, 3 ♂ Shannon), 28 Mar 2002 (30 ♀, 17 ♂ Shannon), 29 Mar 2002 (2 ♀, 3 ♂ Shannon), 30 Mar 2002 (8 ♀, 1 ♂ Shannon). La Guadalupe, Calakmul, 22 Oct 2001 (2 ♀ Shannon), 6 Dec 2001 (1 ♀ Shannon, 1 ♀ CDC), 7 Dec 2001

(7 ♀ Shannon), 8 Dec 2001 (5 ♀, 1 ♂ Shannon), 9 Dec 2001 (1 ♀ Shannon), 10 Dec 2001 (3 ♀ Shannon), 11 Dec 2001 (4 ♀ Shannon), 12 Dec 2001 (5 ♀ Shannon), 13 Dec 2001 (1 ♀ Shannon), 14 Dec 2001 (2 ♀ Shannon), 17 Feb 2002 (1 ♀ Shannon), 18 Feb 2002 (1 ♀ Shannon), 19 Feb 2002 (2 ♀ Shannon), 21 Feb 2002 (2 ♀ Shannon), 23 Feb 02 (1 ♀ Shannon), 24 Feb 2002 (1 ♀ Shannon), 25 Feb 2002 (3 ♀ Shannon), 20 de Noviembre, Calakmul, 22 Mar 2001 (1 ♀ Shannon), Dzibalche, Calkini 06 Jul 2001 (1 ♀ human bait), La Libertad, Escárcega, 01 Nov 2001 (8 ♀, 5 ♂ Shannon), 02 Nov 2001 (7 ♀, 1 ♂ Shannon), 03 Nov 2001 (7 ♀ Shannon, 2 ♀, 1 ♂ CDC), 04 Nov 2001 (2 ♀, 1 ♂ Shannon).

This is the first report of *Lutzomyia (Dampfomyia) permira* for the counties of Calkini and Calakmul. This species had previously been reported in the county of Escárcega by Ramírez-Fraire (1992), Navarro-Correa (1995) and Rebollar-Téllez et al. (1996a). According to Ibáñez-Bernal (2000) the actual distribution of *L. shannoni* may be much greater than that which is known at present. Female *L. shannoni* are antropophilic and may act as secondary vector of *Le. mexicana* in certain areas.

### *Lutzomyia (Psathyromyia) undulata* (Fairchild and Hertig, 1953)

**Material Examined:** 4 ♀. Campeche, Dos Naciones, Calakmul, 28 Mar 2002 (3 ♀ Shannon), La Guadalupe, Calakmul, 21 Feb 2002 (1 ♀ Shannon).

This is the first report *L. undulata* for the county of Calakmul. *L. undulata* had been reported in the county of Escárcega by Navarro-Correa (1995), although to the best of our knowledge there are no specimens available.

### *Lutzomyia carpenteri* (Fairchild and Hertig, 1959)

**Material Examined:** 54 ♀, 31 ♂. Campeche, Dos Naciones, Calakmul, 17 Oct 2001 (4 ♀ CDC), 18 Oct 2001 (2 ♀, 3 ♂ CDC), 22 Nov 2001 (1 ♀ CDC), 24 Nov 2001 (1 ♀ CDC), 18 Jan 2002 (11 ♀ 10 ♂ CDC), 19 Jan 2002 (21 ♀, 5 ♂ CDC), 20 Jan 2002 (9 ♀, 7 ♂ CDC), 21 Jan 2002 (4 ♀, 6 ♂ CDC), 29 Mar 2002 (1 ♀ Shannon).

According to Ibáñez-Bernal (2000) *L. carpenteri* is at present known to occur in the states of Campeche, and Quintana Roo, but he does not quote the records of Ramírez-Fraire (1992), Navarro-Correa (1995) and Rebollar-Téllez et al. (1996a) from Escárcega.

### *Lutzomyia (Nyssomyia) olmeca olmeca* (Vargas and Díaz-Nájera, 1959)

**Material Examined:** 358 ♀, 16 ♂. Campeche, Dos Naciones, Calakmul, 17 Oct 2001 (4 ♀ Shannon), 18 Oct 2001 (8 ♀ Shannon, 3 ♀ CDC), 21 Nov 2001 (23 ♀ Shannon, 1 ♀ CDC), 22 Nov 2001 (11 ♀, Shannon, 13 ♀ CDC), 23 Nov 2001 (9 ♀ Shannon, 10 ♀ CDC), 24 Nov 2001 (17 ♀ Shannon, 4 ♀, 1 ♂ CDC), 18 Jan 2002 (5 ♀ Shannon), 19 Jan 2002 (1 ♀ Shannon), 20 Jan 2002 (6 ♀ Shannon, 2 ♀ CDC), 21 Jan 2002 (7 ♀ Shannon, 1 ♀ CDC), 23 Jan 2002 (3 ♀ Shannon), 24 Jan 2002 (7 ♀ Shannon), 25 Jan 2002 (6 ♀ Shannon), 26 Jan 2002 (6 ♀ Shannon), 25 Mar 2002 (3 ♀ Shannon), 26 Mar 2002 (1 ♀ Shannon), 27 Mar 2002 (4 ♀ Shannon), 28 Mar 2002 (4 ♀ Shannon), 29 Mar 2002 (1 ♀ Shannon), La Guadalupe, Calakmul, 21 Oct 2001 (4 ♀ Shannon), 22 Oct 2001 (1 ♀ CDC), 06 Dec 2001 (4 ♀ Shannon, 2 ♀, 2 ♂ CDC), 07 Dec 2001 (6 ♀ Shannon), 08 Dec 2001 (4 ♀ Shannon), 09 Dec 2001 (4 ♀ Shannon), 11 Dec 2001 (6 ♀ Shannon), 12 Dec 2001 (1 ♀ Shannon), 13 Dec 2001 (5 ♀ Shannon), 14 Dec 2001 (5 ♀ Shannon), 17 Feb 2002 (3 ♀ Shannon), 18 Feb 2002 (3 ♀ Shannon), 19 Feb 2002 (8 ♀ Shannon), 20 Feb 2002 (5 ♀ Shannon), 21 Feb 2002 (7 ♀ Shannon), 22 Feb 2002 (4 ♀ Shannon), 23 Feb 2002 (1 ♀ Shannon), 25 Feb 2002 (10 ♀, 1 ♂ Shannon), 20 de Noviembre, Calakmul, 22 Mar 2002 (6 ♀, 12 ♂ Shannon), Dzibalche, Calkini 06 Jul 2001 (1 ♀

human bait). La Libertad, Escárcega, 01 Nov 2001 (19 ♀ Shannon), 02 Nov 2001 (42 ♀ Shannon), 03 Nov 2001 (9 ♀ Shannon, 10 ♀ CDC), 04 Nov 2001 (28 ♀ Shannon).

In this paper, we report for the first time *L. olmeca olmeca* for the counties of Calkini and Calakmul. *Lutzomyia (Nyssomyia) olmeca olmeca* is currently the proven vector of *L. mexicana* in the Yucatán Peninsula, México (Biagi et al., 1965). In Ibáñez-Bernal (2000), *L. olmeca olmeca* is listed for the Mexican states of Chiapas, Oaxaca, Quintana Roo, Veracruz, and Tabasco. However, in Ibáñez-Bernal (2000b) *L. olmeca olmeca* is listed also for the state of Campeche. In addition, *L. olmeca olmeca* had been reported in the county of Escárcega, Campeche by Ramírez-Fraire (1992), Navarro-Correa (1995) and Rebollar-Téllez et al. (1996a).

### *Lutzomyia (Nyssomyia) ylephiletor* (Fairchild and Hertig, 1952)

**Material Examined:** 25 ♀, 1 ♂. Campeche, Dos Naciones, Calakmul, 26 Mar 2002 (14 ♀, 1 ♂ Shannon), 27 Mar 2002 (4 ♀ Shannon), 28 Mar 2002 (7 ♀ Shannon).

This is the first report of *L. ylephiletor* for the state of Campeche. This species is also known in the states of Chiapas and Tabasco (Ibáñez-Bernal, 2002). Female *L. ylephiletor* have been associated with transmission of *Le. braziliensis* in the neighboring country of Guatemala (Porter et al., 1987; Rowton, et al., 1991).

### *Lutzomyia (Psychodopygus) panamensis* (Shannon, 1926)

**Material Examined:** 402 ♀, 103 ♂. Campeche, Dos Naciones, Calakmul, 17 Oct 2001 (21 ♀, 2 ♂, Shannon, 2 ♀, 1 ♂ CDC), 18 Oct 2001 (25 ♀, 13 ♂ Shannon, 12 ♀, 13 ♂ CDC), 21 Nov 2001 (101 ♀, 1 ♂ Shannon, 1 ♀, 1 ♂ CDC), 22 Nov 2001 (17 ♀, 6 ♂ Shannon, 5 ♀, 4 ♂ CDC), 23 Nov 2001 (53 ♀, 16 ♂ Shannon, 2 ♀, 10 ♂ CDC), 24 Nov 2001 (6 ♀, 4 ♂ Shannon), 18 Jan 2002 (4 ♀, 3 ♂ Shannon, 1 ♀ CDC), 19 Jan 2002 (6 ♀, 7 ♂ Shannon, 1 ♀ CDC), 20 Jan 2002 (12 ♀, 2 ♂ Shannon), 21 Jan 2002 (10 ♀, 4 ♂ Shannon, 1 ♀ CDC), 22 Jan 2002 (5 ♀, 1 ♂ Shannon), 23 Jan 2002 (4 ♀ Shannon), 24 Jan 2002 (1 ♀ Shannon), 25 Jan 2002 (1 ♀ Shannon), 26 Jan 2002 (16 ♀, 1 ♀ Shannon), 25 Mar 2002 (1 ♀ Shannon), 26 Mar 2002 (6 ♀, 1 ♂ Shannon), 27 Mar 2002 (4 ♀ Shannon), 28 Mar 2002 (3 ♀, 1 ♂ Shannon), 29 Mar 2002 (3 ♀ Shannon), 30 Mar 02 (1 ♀ Shannon), La Guadalupe, Calakmul, 22 Oct 2001 (23 ♀, 5 ♂ Shannon), 6 Dec 2001 (2 ♀ Shannon, 1 ♂ CDC), 7 Dec 2001 (6 ♀ Shannon), 8 Dec 2001 (6 ♀ Shannon), 9 Dec 2001 (2 ♀ Shannon), 10 Dec 2001 (3 ♀ Shannon), 11 Dec 2001 (2 ♀ Shannon), 12 Dec 2001 (4 ♀ Shannon), 13 Dec 2001 (3 ♀ Shannon), 14 Dec 2001 (1 ♀ Shannon), 19 Feb 2002 (1 ♀ Shannon), 21 Feb 2002 (1 ♀ Shannon), 20 de Noviembre, Calakmul, 22 Mar 2001 (1 ♀, 1 ♂ Shannon), La Libertad, Escárcega, 01 Nov 2001 (1 ♀, 1 ♂ Shannon, 1 ♂ CDC), 02 Nov 2001 (2 ♂ Shannon, 1 ♂ CDC).

This is the first record of *L. panamensis* in the county of Calakmul. This species had also been reported in the county of Escárcega and in the state of Quintana Roo (Ibáñez-Bernal, 2000b). Female *L. panamensis* have been found naturally infected with flagellates (probably *L. braziliensis*) in Tikal, Guatemala (Rowton et al., 1991).

### *Lutzomyia trinidadensis* (Newstead, 1922)

**Material Examined:** 31 ♀, 5 ♂. Campeche, Dos Naciones, Calakmul, 18 Oct 2001, (1 ♀ Shannon, 3 ♀, 1 ♂ CDC), 21 Nov 2001 (4 ♀ Shannon), 23 Nov 2001 (9 ♀ CDC), 24 Nov 2001 (1 ♀ Shannon, 1 ♀ CDC), 18 Jan 2002 (1 ♀, 2 ♂ CDC), 19 Jan 2002 (3 ♀ CDC), 20 Jan 2002 (1 ♀ CDC), 21 Jan 2002 (6 ♀, 1 ♂ CDC), 26 Mar 2002 (1 ♀ Shannon), 28 Mar 2002 (1 ♂ Shannon).

In this study *L. trinidadensis* is reported for the first time to the county of Calakmul. *L. trinidadensis* had previously been found in the county of Escárcega by Navarro-Correa (1992). This species is also known in the states of Chiapas and Yucatán (Ibañez-Bernal, 2000b), Guerrero and Morelos (Ortega-Gutierrez, 1966).

### ACKNOWLEDGEMENTS

We are grateful to the inhabitants of the study sites for their hospitality during our field trips. The senior writer wishes to thank M.D. Abelaido Chiñas for his kind support throughout the study. This investigation received financial support from the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) ID A00732.

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